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File Code: 2670
Route To: Files

Date: September 11, 2019

Subject: Biological Evaluation for the Flat Country Project

To: Darren Cross – District Ranger

The purpose of this biological evaluation (BE) is to document the potential effects of the proposed action on listed species. The two species listed on the Endangered Species Act (ESA) that will be evaluated are bull trout (*Salvelinus confluentus*) and Upper Willamette spring Chinook salmon (*Oncorhynchus tshawytscha*). These species are listed as "threatened" under the Endangered Species Act. There are four special status species (a Forest Service designation) that will be assessed. These species are two caddisflies, one freshwater snail, and one fish (Pacific lamprey).

Summary of Findings ESA-Listed Fish

Upper Willamette River spring Chinook salmon	May Affect, Likely to Adversely Affect
Upper Willamette River spring Chinook salmon – Critical Habitat	May Affect, Likely to Adversely Affect
Essential Fish Habitat – spring Chinook salmon	Adversely Affect
Bull trout	May Affect, Likely to Adversely Affect
Bull trout – Critical Habitat	May Affect, Likely to Adversely Affect

Summary of Findings Forest Service Sensitive Species

Rhyacophila chandleri* and *Rhyacophila leechi (Caddisflies)	May adversely impact individuals, but not likely to result in a loss of viability in the Flat Country Planning Area, nor cause a trend toward federal listing.
Fluminicola virens (Freshwater snail)	No Impact
Pacific lamprey (*Entosphenus tridentatus*)	No Impact

Project Location: The Flat Country Project is located on the McKenzie River Ranger District, Willamette National Forest, Oregon.

Legal description for proposed units in Lane County; T.15S., R.6E., Sections 24, 25 & 36; T.15S., R.7E., Sections 19 through 22, 27 through 34; T.16S., R.6E., Sections 1, 11, 12, 13 & 14 T.16S., R.7E., Sections 1 through 11, 14 through 19; Willamette Meridian.

Legal description for proposed units in Linn County; T.14S., R.7E., Sections 33 & 34; T.15S., R.6E., Section 12 & 13; T.15S., R.7E., Sections 3 through 7, 15 through 18; Willamette Meridian.

Proposed Action:

The DEIS has developed 3 alternatives:

- Alternative 1 – No Action
- Alternative 2 (Preferred Alternative) – Timber harvest in stands over 80-years old and regeneration harvest.
- Alternative 3 – Timber harvest but no harvest in stands over 80-years old and no regeneration harvest.

Because of the underlying geology and due to the Project Design Criteria (PDCs) that have been developed for this project, all the alternatives would have similar effects to fisheries so they are analyzed together.

The following table provides a comparison of alternatives for the Flat Country Project.

Table 1. Comparison of Alternatives

Proposed Activity	Unit of Measure	Alternative 1	Alternative 2	Alternative 3
Timber Harvest Treatments				
Thinning outside Riparian Reserves	Acres	0	1,772	782
Thinning in Riparian Reserves	Acres	0	164	164
Shelterwood with Reserves	Acres	0	961	0
Gaps	Acres	0	323	133
Dominant Tree Release	Acres	0	119	50
Skips outside Riparian Reserves	Acres	0	426	75
Skips in Riparian Reserves	Acres	0	673	98
Total	**Acres**	**0**	**4,437**	**1,301**

Proposed Activity	Unit of Measure	Alternative 1	Alternative 2	Alternative 3
Estimated Gross Volume	**MMBF**	**0**	**~102**	**~14**
Post-Harvest Fuels Treatments in Timber Harvest Units				
Pile and Burn (mechanical and/ or hand treatments)[1, 2]	Acres	0	2685	945
Post-Harvest Underburn[1, 2]	Acres	0	1752	356
Roadside fuel treatments				
Pile and Burn (mechanical and/or hand treatments)	Acres	0	2305	2305
Meadow Habitat Enhancement				
Removal of encroaching trees followed by broadcast burning	Acres	0	368	0
Road Activities Associated with Harvest				
New Road Construction	Miles	0	0	0
Temporary Road Construction	Miles	0	15.5	6.7
Roads Maintained	Miles	0	108.2	56.2
Road Decommissioning	Miles	0	14.8	14.1
Road Storage	Miles	0	4.7	4.7
Rock obtained from expanding existing quarries	Cubic Yards	0	20,000	20,000
Stream Culvert Replacement	Number	0	66	35
Acres by Harvest System				
Helicopter Harvest	Acres	0	17	7
Skyline Harvest	Acres	0	1,553	487
Ground-based Harvest	Acres	0	1,769	635
Harvest Associated Planting, Snags, and Down Wood				
Planting in Regeneration Harvest	Acres	0	961	0
Planting in Gaps	Acres	0	151	62
Natural Regeneration in Gaps	Acres	0	172	71

Proposed Activity	Unit of Measure	Alternative 1	Alternative 2	Alternative 3
Snag and Down Wood Creation	Snags per acre and linear feet of large down wood of decay classes I-II	0	Retain or create up to 5 snags per acre and at least 240 linear feet of down wood on approximately 961 acres of regeneration harvest as mitigation, and 1936 acres as enhancement	Retain or create up to 4 snags per acre and at least 240 linear feet of down wood on approximately 946 acres as enhancement.
Northern Spotted Owl (NSO) Habitat				
NSO Suitable Habitat in Critical Habitat Treated	Acres	0	725	0
NSO Dispersal Habitat in Critical Habitat Treated	Acres	0	165	106
NSO Non-Habitat Habitat in Critical Habitat Treated	Acres	0	218	218
NSO Suitable Habitat Treated (including skips) [1]	Acres	0	3,068	75
NSO Dispersal Habitat Treated (including skips) [1]	Acres	0	456	299
NSO Non-Habitat Treated (including skips) [1]	Acres	0	1.377	927

1 - These acres are already accounted for in the above table under "Timber Harvest Treatments" and therefore are not included in the total.

2 - Mechanical treatment may include: grapple piling in slash concentrations, yarding tops attached, mastication, or any other mechanical device). Post-harvest fuels treatments methods may change depending on feasibility and funding.

Project Design Criteria to Minimize (or Prevent if applicable) Impacts to Listed Fish and Habitat:

The DEIS has developed design features (also known as PDCs) to reduce environmental effects of the proposed activities and ensure that project activities are implemented to comply with standards and guidelines, conservation strategies, and Best Management Practices. See Section 2.6 of the DEIS to review the PDCs.

In addition to the PDCs developed for the DEIS, there are PDCs associated with the Willamette National Forest Timber Management Treatments Programmatic Consultation for bull trout and spring Chinook salmon. In order for a project to be considered consistent with the programmatic consultation, it must be designed and implemented with the specific programmatic PDCs. A project consistency form was completed by the interdisciplinary team to ensure that the PDCs were incorporated into the project design. The PDCs cover activities such as timber felling, yarding, road and landing construction, road maintenance and reconstruction,

rock quarry operations, road decommissioning, timber transport (haul), and fuels treatment. For a list of the PDCs in the programmatic biological opinion see the project worksheet.

The Riparian Reserve strategy would minimize potential effects to listed fish species and Forest Service sensitive species. The following tables provide information on no-harvest buffers along streams. If the stand was a naturally regenerated stand or was over 80-years old, full buffer widths found in the Northwest Forest Plan were prescribed (Table 2). A site-potential tree height in the upper McKenzie watershed is 180 feet so that was used. If the stand was less than 80-years old and was a previously managed stand, thinning was prescribed to improve conditions and no-harvest widths from programmatic biological opinion (BO) were prescribed (Table 3).

Table 2. Riparian Reserve Widths from the Northwest Forest Plan

Stream Type	Riparian Reserve Width
Fish-bearing	Two site-potential tree heights or 300' whichever is greater
Permanently flowing non-fish-bearing streams	One site-potential tree height or 150' whichever is greater
Intermittent streams	One site-potential tree height or 150' whichever is greater
Constructed ponds or reservoirs	One site-potential tree height or 150' whichever is greater
Lakes and natural ponds	Two site-potential tree heights or 300' whichever is greater

Table 3. No-Harvest Widths in the Willamette NF Timber Harvest BO (Fish)

Stream Class	No-harvest buffer
Class 1	120'
Class 2	100' within 1000' of a Class 1 stream, 75' outside of 1000' from a Class 1 stream
Class 3	60'
Class 4	30'

Class 1 Stream = streams with ESA-listed fish
Class 2 Stream = streams with fish not listed (i.e. cutthroat trout)
Class 3 Stream = perennial non-fish-bearing stream
Class 4 Stream = seasonal or intermittent stream

Species Descriptions in the Project Area:

The biological assessment (BA) that was submitted for consultation has significant information on the life history and challenges bull trout and upper Willamette River spring Chinook salmon face. This document is in the analysis file and is available upon request.

Upper Willamette River spring Chinook Salmon

Scott Creek is designated critical habitat for salmon but due to the flow regime during the spawning season (September through October) it is difficult for adult salmon to negotiate the stream channel. Annual stream flow conditions would determine access to Scott Creek from the McKenzie River.

Spawning surveys have not taken place in Scott Creek but based on surveys in another Western Cascades geology stream (Deer Creek), it is estimated that there could be less than a dozen redds in a spawning season. During the spawning season the McKenzie River has substantial flow due to its spring-fed nature in the upper watershed and provides excellent conditions for spawning spring Chinook salmon so very few salmon enter the warmer, low flow, Western Cascades geology streams.

Lost Creek is designated critical habitat for spring Chinook salmon. The Upper McKenzie Watershed Analysis (USDA 1995) describes that much of the Lost Creek sub-watershed drains gently, sloping terrain of the High Cascades province and have new and old lava flows that have large water storage capacity. These conditions create stream habitat very similar to that found in Sweetwater, Anderson, and Olallie Creeks. Lost Creek lies within a glacial trough where the creek's springs are located.

Bull trout

Bull trout inhabit the McKenzie River because of the spring-fed nature of the upper watershed. This provides cold, clean water which bull trout require. There are four streams in the project area that are designated as critical habitat for bull trout. They are Anderson Creek, Olallie Creek, Sweetwater Creek, and Lost Creek. All four of these streams are spring-fed, have abundant large woody material, and have very little variation in the annual flow regime. All four of these streams are critical to the survival and viability of the species.

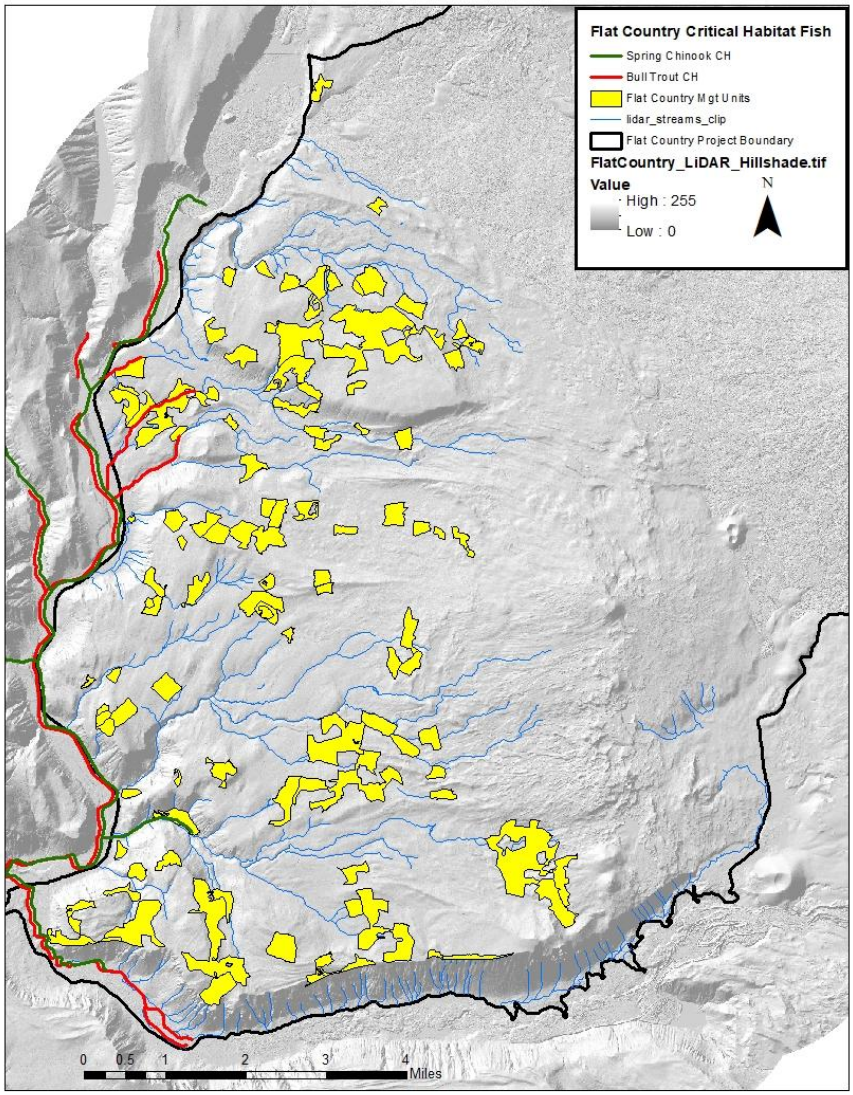

Figure 1. Critical Habitat for Bull Trout and Spring Chinook Salmon Flat Country Project Area

Forest Service Special Status Species

Two aquatic insects found on the Regional Forester's sensitive species list have been documented on the Willamette National Forest. These aquatic insects are caddisflies and little is known about them. In fact, the common name for these caddisflies is "A Caddisfly." A short summary of the distribution and known habitat associations are provided below.

The spring-fed streams in the project area provide excellent habitat for the two caddisflies that have been documented on the Willamette National Forest.

***Rhyacophila chandleri*:** In Oregon, this species is documented on Willamette, Deschutes, and Umpqua National Forests. It is documented on the Willamette National Forest as a rare insect on the H.J. Andrews Experimental Forest.

The entire *Rhyacophila* genus, whose name is derived from the Greek roots *rhyaco* (stream or torrent) and *philia* (fondness), is confined to running water. In the Cascade Mountains of Oregon, this species is associated with very cold, larger spring-fed streams (USDA Forest Service and USDI Bureau of Land Management 2012a). Elevations of known populations range from around 1219 to 1700 m (4000 to 5600 ft.) in Oregon.

***Rhyacophila leechi*:** In Oregon, *Rhyacophila leechi* is documented to occur on the Willamette National Forest and on BLM land in the Medford District.

Rhyacophila leechi adults have been collected from springs and cold, spring-fed streams. This species appears to require colder water temperatures than the common and more widely distributed *Rhyacophila. verrula,* and is likely confined to smaller, headwater streams and springs (USDA Forest Service and USDI Bureau of Land Management 2011). Oregon sites range in elevation from 440 to 980 m (1444 to 3210 ft.) (USDA Forest Service and USDI Bureau of Land Management 2011).

Fluminicola virens: is a freshwater snail. It has not been documented on the McKenzie River Ranger District but has been documented on other ranger districts on the Willamette National Forest.

Fluminicola virens are members of the genus *Fluminicola* which are usually found in clear, cold waters with high dissolved oxygen content. Large species, such as *F. virens*, are typically found in streams. Generally, these species prefer cold, clear, streams with near-saturation amounts of dissolved oxygen, no or minor nutrient enhancement (oligotrophic waters); continual current; and coarse but stable substrate (USDA Forest Service and USDI Bureau of Land Management 2013).
Fluminicola virens is known only from Oregon and Washington in the Northwestern United States. In Oregon, it is limited in distribution to the Willamette and lower Columbia River basins where it occurs in the lower Columbia River below Portland, the upper Deschutes River, the Umpqua River, the Willamette River including the Tualatin and Clackamas Rivers.

Pacific lamprey (*Entosphenus tridentatus*): is an ancient fish and has been documented in the McKenzie River but not in the Flat Country project area. The following information on Pacific lamprey was obtained on the NatureServe Explorer web site (http://explorer.natureserve.org).

This species is mainly anadromous. Newly metamorphosed individuals migrate from parent streams to the Pacific Ocean. Upstream migrations may be as long as several hundred kilometers. Land-locked populations omit the oceanic phase but migrate between lakes and spawning streams.

The predatory phase of the life cycle (excluding land-locked populations) occurs in the ocean, primarily near stream mouths in estuaries and in other coastal areas but sometimes far away. Freshwater-resident populations exist in several areas in British Columbia and elsewhere.

Adults spawn in runs and riffles in rock, sand, or gravel-bottomed clear streams, in small, shallow depressions, or crude nests, at the heads of riffles. Water depth at spawning sites often is 30-150 cm. Eggs hatch in 2 or 3 weeks. Ammocoetes (larval lamprey) remain in stream,

metamorphose in 4-6 years (late September-October). Ammocoetes inhabit shallow backwater and eddy areas along edges of streams in mud, silt and sand.

Effects Analysis:

The underlying geology in the project area itself helps protect the streams from the potential impacts of timber harvest activities due to the permeable nature of the soils, the low sediment yield in the watershed, and the limited distribution of perennial streams in the project area. The upper McKenzie watershed is in an area of volcanic terrain on the west side of the Cascade Range. Two physiographic provinces meet here: The Western Cascades and High Cascades. The Flat Country project is primarily located in the High Cascades geologic province.

Stark contrasts in topography and drainage development reflect the underlying geology, geomorphology, and hydrology of the upper McKenzie watershed. Western Cascades volcanic landscapes comprised of older, deeply weathered, and uplifted basalt flows and volcaniclastic rocks have evolved through debris sliding, debris flows, and deep-seated mass wasting. Steep slopes with shallow, rapid subsurface flow are dissected by a dense network of steep, incised channels that efficiently convey surface runoff and sediment. Stream channels in the Western Cascades exhibit dynamic morphology in response to peaked storm runoff, high sediment yield, and periodic debris flows (Stillwater Sciences 2006).

High Cascades landscapes, in contrast, are composed of broad areas of hydrologically disconnected surface runoff due to low gradient topography, disorganized drainage patterns, and subsurface flow through relatively unweathered and rapidly permeable Quaternary volcanic flows. Stream discharge remains relatively constant throughout the year regardless of winter rainfall or rain-on-snow events. This characteristic surface and subsurface hydrology, in combination with predominantly low gradient hillslopes with low drainage density, results in very low sediment yield in the High Cascades. Channel morphology is relatively static, as evidenced by mature upland and riparian vegetation growing near a stable base flow water surface elevation, and moss-covered bed particles and large wood in active channels (Stillwater Sciences 2006).

The Upper McKenzie Watershed Analysis (USDA 1995) documented that the High Cascades are divided into three areas: The Early High Cascades volcanic flows (9 - 4 million years-old); younger, Late High Cascades volcanic flows (4 million to 12,000 years-old); and recent volcanic flows (12,000 - 1,500 years-old).

The filtering characteristics of the younger High Cascades lava and glacial deposits produce a subsurface aquifer very low in fine sediments. Unlike streams that flow overland within stream channels, the water that flows subsurface within the upper McKenzie does not have the potential to pick up channel sediment and is not exposed to air temperatures and direct sunlight that could heat the water. This results in springs with extremely clean, cold water and is the source for Sweetwater, Anderson, and Olallie Creeks. Because these creeks were filled by younger High Cascade lava flows, they flow within channels that have broad valley bottoms that

are not incised or entrenched (USDA 1995). The lower sections of these three creeks are all critical habitat for bull trout and provide the type of habitat that *Rhyacophilian* caddisflies require. The upper portions of these creeks are non-fish-bearing intermittent creeks.

In contrast, streams such as Kink, Twisty, Boulder, and Scott that flow over the lava of the older High Cascades and glacial deposits have more incised channels than those flowing over the Late High Cascades. The channels are more incised because they have down-cut through the glacial deposits, returning to their original channels within the older High Cascades lava that have been subjected to fluvial process for a longer period of time. The upstream portions of these channels are intermittent where streams flow over the top of the glacial deposits and have not cut down into the underlying lava of the older Western Cascades (USDA 1995). The lower portions of Scott Creek near the McKenzie River confluence are designated critical habitat for upper Willamette River spring Chinook salmon.

The PDCs that were developed for the DEIS and for the programmatic biological opinion will prevent and reduce effects to ESA-listed fish and Forest Service sensitive species. Riparian Reserves and the no-harvest buffer widths found in tables 2 and 3 will prevent sediment delivery to Class 1 streams, maintain all shade trees, and maintain all potential large woody material sources.

The potential for adverse effects to streams with ESA-listed fish would come from timber transport during wet-weather conditions. The programmatic BO for timber operations has specific PDCs for wet-weather haul that will reduce the potential for effects (available upon request). In addition, the interdisciplinary team has developed PDCs for wet-weather haul (see DEIS).

It will be expected that additional maintenance requirements will be needed for wet and snow weather haul. In addition to the requirements that the contractor monitor road conditions during wet weather, the Forest Service also monitors conditions. The district hydrologist, soil scientist, and fisheries biologist all work with the sale administrator to monitor conditions during operations.

The following are conditions that are monitored:

ROAD DISTRESS: this indicates that further maintenance must be performed as specified in the contract. If maintenance cannot be performed then use must be reduced or stopped.

ROAD DAMAGE: this is a reduction in the ability of the road or structure to carry traffic that can't be corrected by recurring maintenance methods. Use must be stopped and the road repaired.

ENVIRONMENTAL DAMAGE: If the displacement of soil material resulting from contract operations is delivered into intermittent or perennial streams that result in an increase in sediment, then use must be stopped and road repaired.

Spring Chinook Salmon:

Alternatives 2 and 3 both propose to thin previously managed stands near spring Chinook critical habitat and would implement no-harvest widths found in table 3. The units are 360 (near Scott Creek figure 2) and 1960 (near Lost Creek figure 3). Note that critical habitat for spring Chinook and bull trout overlap each other in Lost Creek. These widths will maintain 100% of the stream shade that exists in the Riparian Reserves so there will be no effect on stream temperatures. Thinning within one site potential tree height means that the supply of large woody material would be affected. The hydrology analysis found that the Riparian Reserve strategy would maintain 90% of the supply but that means there could be a 10% loss of trees that could reach the channel. This would be a direct negative effect on the large woody material supply. However, by thinning the outside of the 120-foot no-harvest buffer tree growth would be accelerated due to a reduction in competition between conifer trees. These larger trees would be beneficial to the first reach of Scott Creek (fish-bearing) as it currently does not meet properly functioning conditions (see hydrology sectionin EIS 3.3.4 and table 16).

Any negative or benefical direct or indirect effect of thinning on fish habitat in Lost Creek would be difficult to measure because there will be a 120-foot no harvest buffer and there is an existing road (2600350), mature forest, and a scree slope between portions of the unit and the creek. Despite the difficulty in measuring the effects, they would not be insignificant. Thinning within one site potential tree height means that the supply of large woody material would be affected. The hydrology analysis found that the Riparian Reserve strategy would maintain 90% of the supply but that means there could be a 10% loss of trees that could reach the channel. This would be a direct negative effect on the large woody material supply in Scott Creek and Lost Creek.

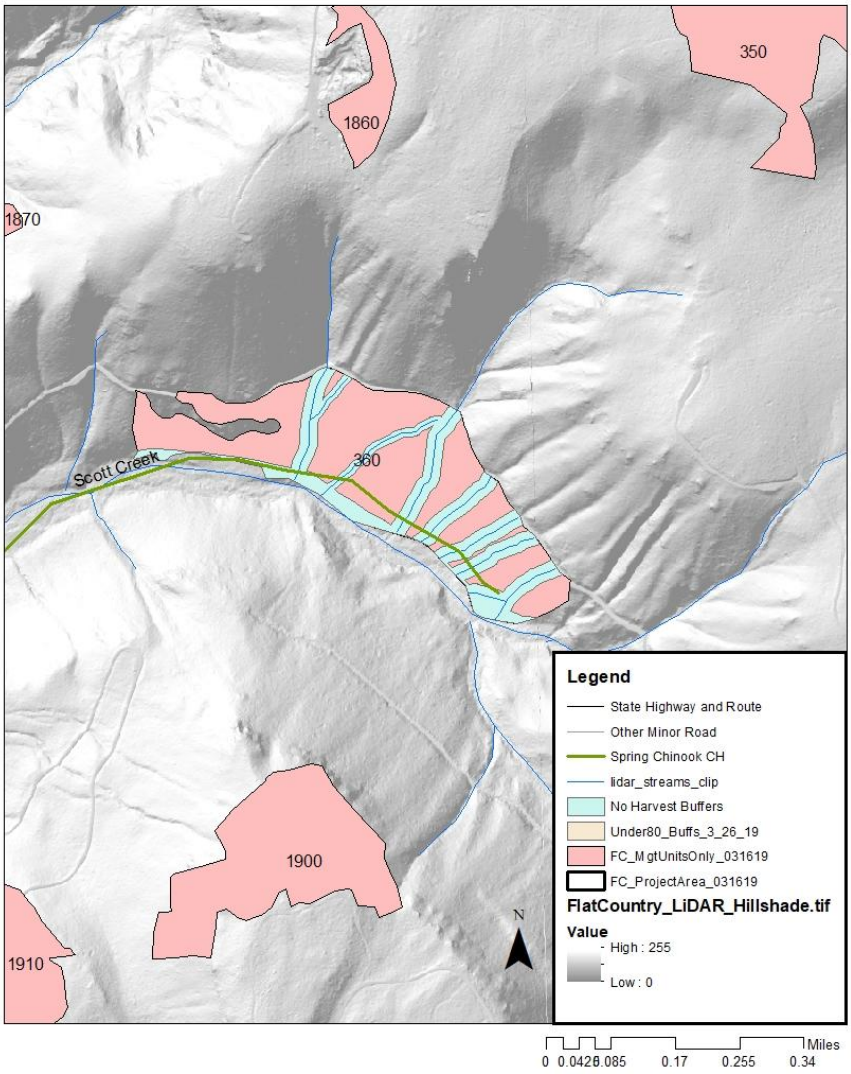

Figure 2. Spring Chinook Salmon Critical Habitat in Scott Creek and Unit 360

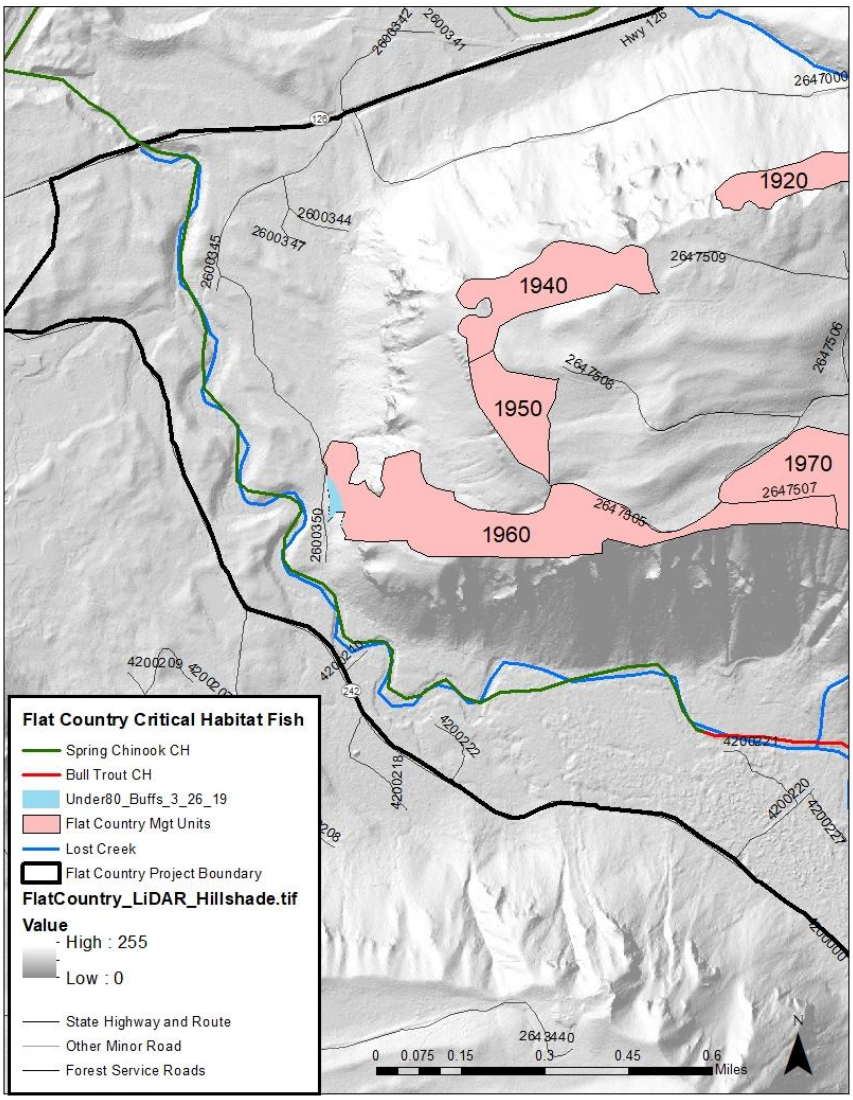

Figure 3. Spring Chinook Salmon and Bull Trout Critical Habitat in Lost Creek and Unit 1960

Alternatives 2 and 3 would cause changes to the sediment regime in the planning area and this would have both negative and beneficial effects on salmon and their habitat.

Sediment would have a negative effect on spring Chinook salmon and designated critical habitat caused by timber haul, especially during wet weather. An analysis of estimated sediment outputs from roads in the project area was completed using the roads module of the Watershed Erosion Prediction Project (WEPP) model. The same analysis was conducted for each alternative incorporating all project related road maintenance, temporary road construction activities, and haul route activity. Results were calculated to estimate sediment production rates during the implementation of the project as well as conditions following completion of the project. Table 26 (hydrology section 3.3.11) shows the estimates of sediment production rates based on WEPP.

For both action alternatives, annual sediment yield increases during harvest activities. This represents an estimated 16-24 percent increased contribution of sediment that cumulatively adds to sediment already produced under the existing road system. Alternative 2 shows the highest increase during operations when there is increased traffic on haul routes and freshly established temporary roads. By implementing either Alternative, overall human caused sediment input would decrease and estimated 3-14 percent from current levels following the completion of project related activities.

The negative direct and indirect effects on spring Chinook salmon would be greatest for haul routes near their habitat. Unit 360 is adjacent to designated critical habitat for spring Chinook habitat in Scott Creek. Timber haul would take place on the 2649 road and there are 0.35 miles of road that are within 500 feet of Scott Creek. This increases the chances of sediment reaching salmon habitat especially during wet-weather haul. Fine sediment can adversely affect the survival of salmon eggs in the redd.

Unit 1960 is near designated critical habitat in Lost Creek (see figure 28). The 2600350 road is close to Lost Creek but would not be used for timber haul. Instead, trees would be yarded uphill to a landing and timber haul would be via the 2647505 road to the 2647 road to Highway 126. The 2647 roads are not near salmon habitat and Highway 126 is paved. Because of this, it is unlikely that sediment will reach Lost Creek due to timber haul.

Bull Trout:

The direct and indirect effects to bull trout from Flat Country Project activities would essentially be the same as those described in the spring Chinook section above. However, due to the differences in the distribution of spring Chinook and bull trout in the project area (see figure 2) there are some specific differences.

Large wood delivery and shade will have full protection Riparian Reserves (table 2) along units 1260, 1300, 1310, and 1320. These units are adjacent to critical habitat in Sweetwater, Anderson, and Olallie Creeks (figure 4). Thinning is proposed in unit 1960 which is close to Lost Creek critical habitat (figure 3) which would have Riparian Reserve prescritions found in table 3. As with spring Chinook salmon, any negative or benefical direct or indirect effect of thinning on fish habitat in Lost Creek would be difficult to measure because there will be a 120-foot no harvest buffer, there is an exising road (2600350), mature forest, and a scree slope between portions of the unit and the creek. Despite the difficulty in measuring the effects, they would not be insignificant. Thinning within one site potential tree height means that the supply of large woody material would be affected. The hydrology analysis found that the Riparian Reserve strategy would maintain 90% of the supply but that means there could be a 10% loss of trees that could reach the channel. This would be a direct negative effect on the large woody material supply which affects habitat complexity in Lost Creek.

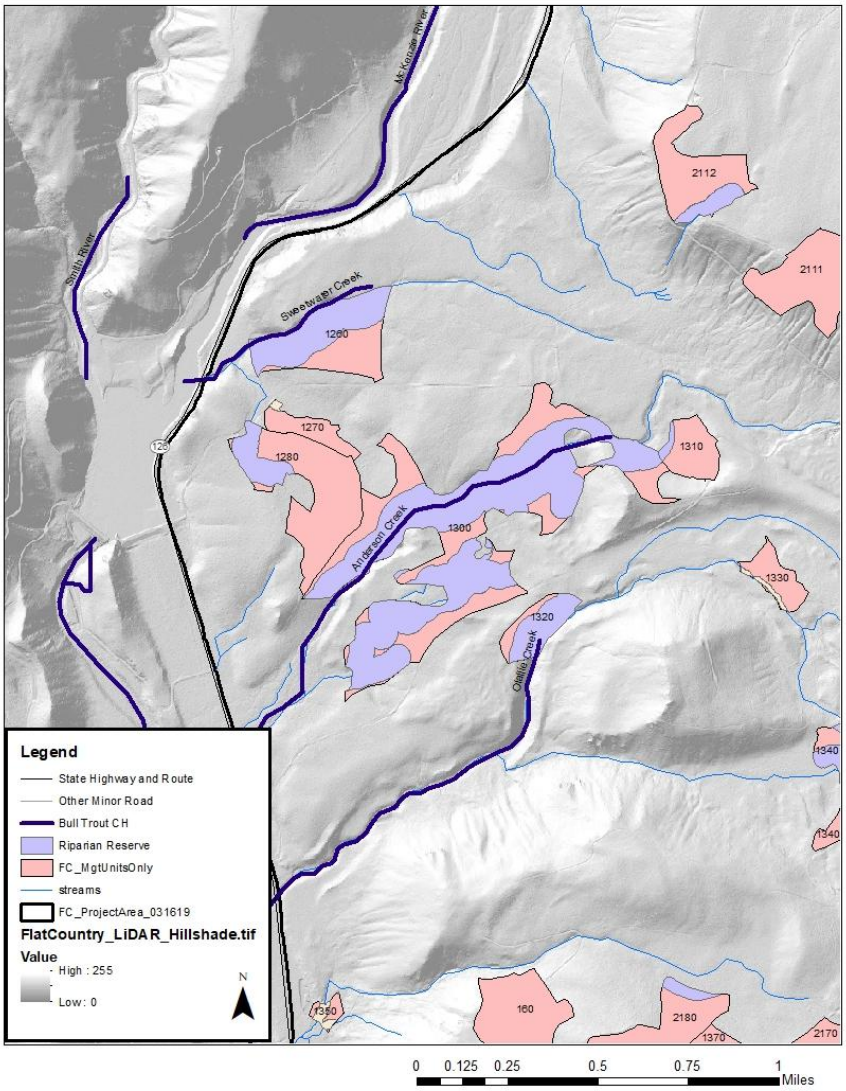

Figure 4. Bull Trout Critical Habitat and Riparian Reserves in Project Units

The effects of sediment on bull trout would also be similar to those described for spring Chinook salmon but due to differences in distribution the specific areas would be different. There is a total of 0.95 miles of timber haul within 500 feet of bull trout habitat that could take place during wet-weather conditions. This would be on the 2600722 road (0.62 miles), 2600727 road (0.08 miles) and the 2657 (0.25). The 2657830 does not have timber haul within 500 feet of bull trout habitat but it does cross Anderson Creek in a section where the creek is intermittent-flowing but also where some substantial springs cross the road. This is the beginning of Anderson Creek's perennial section of stream and sediment delivery could occur during wet-weather haul and road maintenance. The 2657830 road crosses Anderson Creek about 4,500 feet upstream of bull trout critical habitat (figure 5).

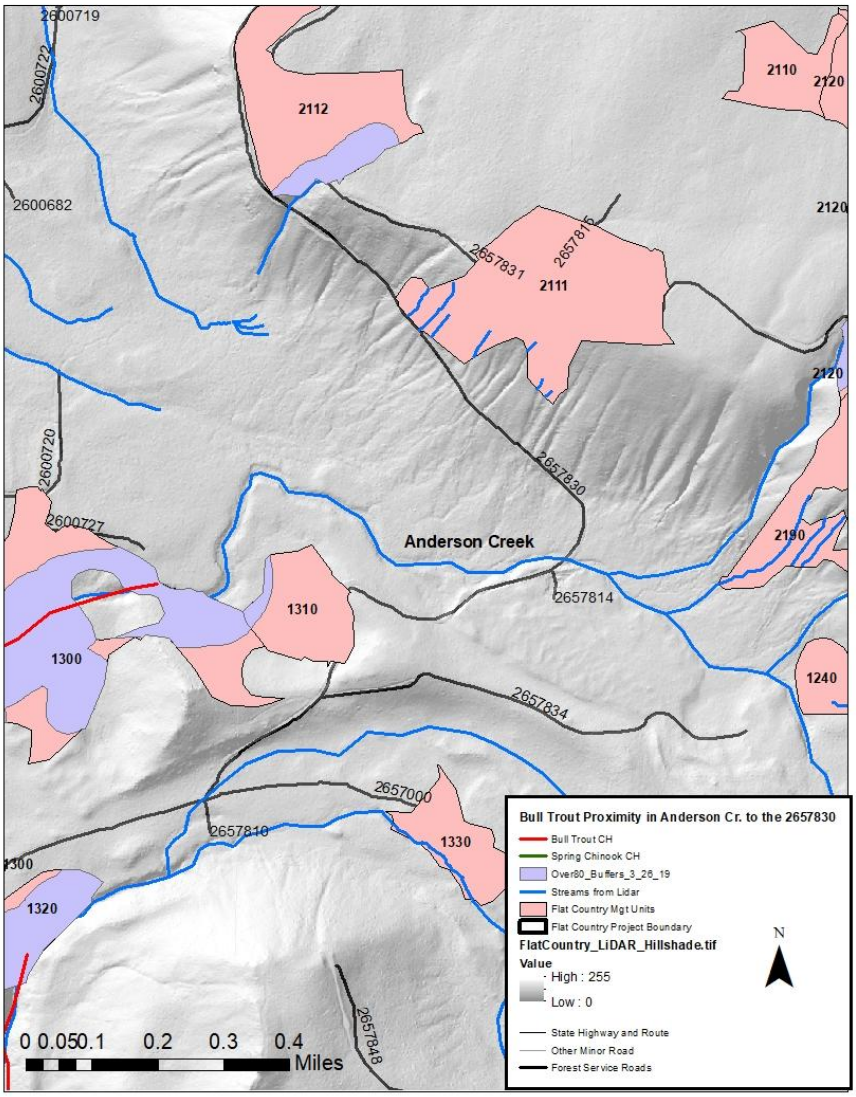

Figure 5. Bull Trout Critical Habitat and the 2657830 Road

Effects Determinations

Upper Willamette spring Chinook salmon: May affect, Likely to Adversely Affect (LAA). This is due to the thinning in stands 360 and 1960, and the effects of sediment due to wet weather haul.

Upper Willamette spring Chinook salmon Critical Habitat: May affect, Likely to Adversely Affect (LAA). This is due to the thinning in stands 360 and 1960, and the effects of increased sedimentation due to wet weather haul.

Bull trout: May affect, Likely to Adversely Affect (LAA). This is due to the effects of increased sedimentation due to wet weather haul.

Bull trout Critical Habitat: May affect, Likely to Adversely Affect (LAA). This is due to the effects of increased sedimentation due to wet weather haul.

Rhyacophila chandleri and *Rhyacophila leechi*:

It is unknown if these species inhabit the spring-fed creeks in the project area. Sweetwater, Anderson, and Olallie Creeks provide the type of habitat that these caddisflies require to fulfill their life-history requirements. The McKenzie River Ranger District is conducting sampling in these creeks in 2019. Given the habitat and water quality conditions in the spring-fed creeks, it is probable that these caddisflies inhabit these streams.

Rhyacophila chandleri, and *Rhyacophila leechi* have not been documented in the Flat Country project area but have been documented on the McKenzie River Ranger District. Only limited sampling has taken place in the past, but during calendar year 2019 extensive surveys for caddisflies are taking place in the spring-fed streams in the Flat Country Project area.

Since these species require the same type of habitat that bull trout need (i.e. cold, spring-fed streams) the direct and indirect effects on aquatic insects would be similar to those of bull trout. In Sweetwater, Anderson, and Olallie Creeks 100% of the shade and large woody material available to the stream would be maintained. Sediment would be delivered to streams with suitable habitat for these caddisflies and have negative impacts on them. This is especially true at the 2657830 road crossing at the Anderson Creek springs.

Alternative 2 would fall and leave trees along a spring-fed creek in unit 1590. This stream is suitable habitat for *Rhyacophila chandleri* due to elevation. Table 20 in the hydrology section of the EIS displays fall and leave treatments for the Flat County Project. This activity would have short-term impacts on individuals (i.e. by a tree falling on them) but would have long-term (decades) beneficial impacts by increasing stream complexity and by protecting overall shade conditions and bank stability. Alternatives 1 and 3 would not fall and leave trees in this unit so these alternatives would not have the same effects as alternative 2. That is, the channel would not benefit from the addition of large wood but no individuals would be impacted from falling trees.

Based on this analysis, the Flat Country project **may adversely impact individuals, but not likely to result in a loss of viability in the Flat Country Planning Area, nor cause a trend toward federal listing.** This effects determination is due to the potential for sediment delivery from timber haul and maintenance activities on the 2657830 road and fall and leave actions in unit 1590.

Fluminicola virens:

Fluminicola virens is a freshwater snail that has not been documented on the McKenzie River Ranger District but has been documented on other ranger districts on the Willamette National

Forest. Because it has not been documented on the ranger district no further analysis will take place. However, the Riparian Reserve strategy and PDCs will protect habitat for these species. Therefore, the Flat Country project will have ***No Impact (NI)*** on this species.

Pacific lamprey:

Pacific lamprey have been documented on the ranger district (South Fork McKenzie River below Cougar Dam), but have not been documented as far upstream as the Flat Country project area. Like the ESA-listed fish, the Riparian Reserve strategy and PDCs will protect habitat for this species. Therefore, the Flat Country project will have ***No Impact (NI)*** on this species.

Magnuson-Stevens Fishery Conservation and Management Act:

Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act is designated in all areas except above impassible dams (i.e. Blue River Dam), and natural migration barriers. The Magnuson-Stevens Fishery Conservation and Management Act reauthorization in 1996 established a new requirement for "Essential Fish Habitat" (EFH) that requires federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect EFH. Essential Fish Habitat for the Pacific coast salmon fishery means those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. The species designated in the McKenzie River is spring Chinook salmon.

There will be an adverse affect to EFH in the Flat Country project area for the same reasons there would be an adverse affect to listed Upper Willamette River spring Chinook salmon. That is, EFH in the project area would be subject to negative effects of thinning in the Riparian Reserves by removing about 10% of the woody material supply that could be delivered to fish-bearing streams. However, in the long-term (decades) the thinned area of the Riparian Reserve would see increased tree growth (height and diameter) due to reduced competition with other conifer trees. For example, unit 590 is adjacent to Scott Creek and surveys show that the first reach of the stream is low in "large wood" abundance (i.e. trees at least 50 feet long and 36 inches in diameter) so there is not enough wood to provide complex habitat that fish require. Thinning would accelerate the time and improve the quality of future woody material delivered to the stream.

The Flat Country project would also cause increases in sediment production during harvest activities but would decrease overall sediment production after all project related activities are complete. The increase in sediment would have negative effects on salmon because it can increase turbitity and impact egg and embryo survival. The reduction in overall sediment production, combined with the road decommissioning work completed with the Robinson Scott EIS (1997-2016), would have beneficial effects on EFH in the project area.

/s/Ramon Rivera
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